REMARKS

Applicants respectfully request that Examiner reconsider the present application in view of the foregoing amendments to the claims.

In the present application, claims 1-18 are pending. Claims 1-9 were previously withdrawn from consideration. Claims 10 and 13 have been amended, wherein no new matter has been added. Also, various parts of the present specification, including the Abstract, have been amended. No new matter has been added by way of these amendments to the specification as well.

The amendments to claims 10 and 13 and to the specification are editorial in nature. As an example, parts of the specification are changed to replace "-M" and "-M'" (at pages 10, 11, 30, 34 and 81) of the formulae with "M" and "M'", respectively. These amendments are supported by Example 7; page 69, lines 1-2; page 53, lines 12-22; and Fig. 3 as follows.

The formula $|\eta^*|$ = A exp (-M/RT), as an example, in the claims and present specification has been amended to $|\eta^*|$ = A exp (M/RT) (or -M' to M') by deleting the negative indication (-). This amendment is supported by the fact that M(=EA) disclosed in the Example 7 is a positive value. Example 7 provides 52 as the activation energy value M (see Table 2 on page 72; Example 7 is described starting at page 64 of the specification). It is described at page 69, lines 1-2, that Ea is equal to M, so that Ea also is a positive value. Ea can be calculated

according to the description on page 53, lines 12-22, by determining the temperature dependency of the shift factor a_T from the formulae:

$a_T = Aexp(-Ea/R(T-Tref))$ ...formula (z)

$\eta_T = a_T\eta_{T0}$ ...WLF formula.

Applicants also enclose a drawing to help explain the support for these amendments. As illustrated in the attached drawing, η^* is higher at 170°C than at 190°C, and is lower at 210°C than at 190°C (i.e., 701°C>190°C>210°C). That is, η^* decreases as the temperature increases. Therefore a_T must be smaller when the temperature is higher.

Accordingly, the shift factor will be smaller than 1 when the temperature is high, and greater than 1 when the temperature is low. That is, η^* must become lower as the temperature increases. Thus, the viscosity lowers with an increase in temperature.

In order to satisfy the above relationship between the viscosity and the temperature, the value M in the formula $|\eta^*|=Aexp(M/RT)$ must be positive (see the curve for M>0 in the attached drawing). If the value M is positive and $|\eta^*| = A \exp(-M/RT)$, the viscosity η^* monotonously decreases with lowering of the temperature T (see the curve in the drawing for Aexp(-M/RT) (M>0)). Therefore "-M" in the current formula $|\eta^*|=Aexp(-M/RT)$ is an error that is obvious to the skilled artisan.

Applicants add that because these changes are clarifying in nature and are not narrowing in scope, Applicants are in no way conceding any

limitations with respect to the interpretation of the claims under the Doctrine of Equivalents.

Also, support for the changes at pages 17, 19, 32, 42 and 45 (referring to "(T-Tref.)" and the "WLF equation") can be found, for example, at page 53, lines 12-21 of the present specification. With these changes, other parts of the specification were appropriately amended (*i.e.*, page 30, line 4 from the bottom).

Thus, no new matter has been added.

Based upon the above considerations, entry of the present amendment is respectfully requested.

In view of the following remarks, Applicants respectfully request that the Examiner withdraw all rejections and allow the currently pending claims.

Specification

The abstract of the disclosure is objected to due to not being limited to one paragraph and the length thereof (as stated in paragraphs 2-3 of the Office Action). Applicants respectfully refer the Examiner to the abstract as amended. Accordingly, withdrawal of this objection is respectfully requested.

Issues Under 35 U.S.C. § 103(a)

Claims 10-18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nakashima *et al.* (U.S. Patent No. 4,076,220; "Nakashima '220") in view of Rodriguez (*Principles of Polymer System*, pages 160-162 (1970); "Rodriguez") (as stated in paragraphs 4-5 of the Office Action). This rejection is respectfully traversed, and reconsideration and withdrawal thereof are respectfully requested.

Distinctions Over the Cited Combination of Nakashima '220 and Rodriguez

The Office Action discusses the descriptions in Nakashima '220 and Rodriguez and concludes that combining these references would be proper. The Office Action also discusses how there is only a difference of disclosure of F_1 between the instantly pending claims and the Nakashima '220 reference. However, Applicants respectfully submit that there are fundamental differences between the present invention and the cited references (and the combination thereof), and that one of ordinary skill in the applicable art would not combine these reference in order to achieve the present invention as follows.

(A) Different Goals and Problems Addressed

Applicants first submit that Nakashima '220 has a different objective and method than the present invention so that one of ordinary

skill in the art would not even refer to this reference in the first place in order to achieve the present invention.

The cited primary reference of Nakashima '220 is concerned with a method for producing a rubber composition from rubber raw material and additives such as a filler so as to achieve desirable dispersion of the filler. However, despite its advances, Nakashima '220 takes no account of the problems associated with the art, such as the drastic die swell and property deteriorations (*i.e.*, pseudo-gelation) of the vulcanized rubber in the subsequent step (*i.e.*, extrusion).

On the other hand, the present invention achieves evaluation methods whereby not only rubber compositions with dispersed fillers may be obtained, but also the kneading status is monitored and controlled in the production of the rubber composition so as to prevent the aforesaid problems, such as the pseudo-gelation (associated with Nakashima '220), in forming the rubber composition by an extruder or an injection molding machine. That is, the present invention is characterized in that it employs an index for both filler dispersion and kneading status.

(B) Different Construction and Methods

Applicants next submit there is a difference in construction and methodology between the present invention and the cited references.

The method of the cited Nakashima '220 reference achieves certain desired dispersion of filler by detecting the plasticity (ML) of the

rubber raw material as a peak electric power, comparing the detected peak electric power with a predetermined standard, and controlling total electric energy to perform optimum kneading. One of ordinary skill in the art would understand such a method employs a different construction from that of the present invention.

Contrary to Nakashima '220, the methods of the present invention comprises the step (5) of measuring a complex viscosity coefficient (η^*) of a kneaded rubber composition, the step (6) of calculating a kneading status monitor index (M), and the step (7) of comparing the kneading status monitoring index (M) with a predetermined target kneading status monitor index (P).

Thus, the methods of the present invention are patentably distinct from the Nakashima '220 method in that (a) a specific formula is employed that is not found in Nakashima '220 (*i.e.*, $|\eta^*(T)| = A \exp (M/RT)$), (b) the complex viscosity coefficient of the composition of the present invention is measured under at least two different temperatures, and (c) the index obtained in the present invention is rather a kneading status monitoring index. With respect to difference (b), Nakashima '220 instead measures the plasticity during continuous kneading (instead of measuring under at least two different temperatures). With respect to difference (c), the present invention uses a kneading status monitoring index that indicates probability of drastic viscosity increase when shear is applied in the subsequent steps rather than a dispersion index.

Thus, upon a reading of Nakashima '220, one of ordinary skill in the art would understand that the present invention is patentably distinct from methods and construction of the cited Nakashima '220 reference.

(C) Achievements by the Present Invention

The present invention also unexpectedly solves problems associated in this art, whereas Nakashima '220 has failed to do so. Specifically, with regard to the features (b) and (c) mentioned in the preceding paragraph, the problem addressed in the present invention is the phenomenon that a viscosity of a kneaded composition during extrusion increases, which is known as a "pseudo-gel" phenomenon. The pseudo-gelation is attributed to local crosslinking of radicals that are generated in the rubber composition by the kneading process (specifically by molecular breakage in the kneading for dispersing carbon black).

Therefore, and as a difference from the present invention, Nakashima '220 fails to monitor the phenomenon caused by the pseudo-gelation because the mechanical, continuous kneading of this reference's method will break the local crosslinked sites. Reliable and stable monitoring of the pseudo-gelation of the composition is impossible in Nakashima '220, because the kneading status has both the pseudo-gelation and mechanical breakage of existing pseudo-gel. This phenomenon is even described by Applicants in their specification at page 4, lines 9-13:

> "... it [the pseudo-gelation] is scarcely observed in ML (1+4) Mooney viscosity at 100°C. However, when it is continuously rotated for about 1 hour, i.e., ML (1+59) 100°C, a phenomenon with a large increase of Mooney viscosity (torque) can be easily observed during the measurement time."

In this case, the torque does not stabilize even after the viscosity increases, so that quantitative monitoring of the pseudo-gelation is infeasible.

On the other hand and in contrast to Nakashima '220, the viscosity η^* from the dynamic viscometry (oscillating) can be measured without adversely affecting and breaking the structure of the measurement specimen, so that the object of the present invention is achieved.

Accordingly, one of ordinary skill in the art understands that the (plasticity) ML of Nakashima '220 and the complex viscosity coefficient η^* determined by dynamic viscometry as in the present invention are in fact different kinds of plasticity.

(D) Improper Combination With Rodriguez

The differences mentioned above, including difference (a) (the present invention employs a specific formula) is relevant since one of ordinary skill in the art would not be motivated or reasonably expect to be successful in combining Nakashima '220 with the secondary reference of Rodriguez. This because the cited Rodriguez reference illustrates the relationship between temperature and viscosity, but does not address

the pseudo-gelation associated with Nakashima '220. As mentioned, reliable and stable monitoring of the pseudo-gelation of the composition is impossible in Nakashima '220 since the kneading status has both the pseudo-gelation and mechanical breakage of existing pseudo-gel.

In fact, here, no particular method is available to determine the F_1 function in Rodriguez given the disclosure of these references. Nakashima '220 does not even provide a specific indication of ML, W and T values. Further, it is unclear to one of ordinary skill in the art what the relationship between F_1 and ML is upon a reading of these references. Even if W and T are specified in this reference, one of ordinary skill in the art would not even be able to determine ML as achieved by the present invention upon a reading of these references. Thus, Rodriguez does not account for the deficiencies of Nakashima '220, and these references have been improperly combined.

Therefore, Applicants respectfully submit that this rejection has been overcome. U.S. case law squarely holds that a proper obviousness inquiry requires consideration of three factors: (1) the prior art reference (or references when combined) must teach or suggest all the claim limitations; (2) whether or not the prior art would have taught, motivated, or suggested to those of ordinary skill in the art that they should make the claimed invention (or practice the invention in case of a claimed method or process); and (3) whether the prior art establishes that in making the claimed invention (or practicing the invention in

case of a claimed method or process), there would have been a reasonable expectation of success. *See In re Vaeck*, 947 F.2d, 488, 493, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991); *see also In re Kotzab*, 55 USPQ2d 1313, 1316-17 (Fed. Cir. 2000); *In re Fine*, 5 USPQ2d 1596 (Fed. Cir. 1988). Here, the requisite motivation and reasonable expectation at the very least have not been found because of such differences mentioned above (*i.e.*, differences (a)-(c) explained above).

Applicants further submit that the requisite motivation and reasonable expectation of success are lacking for a further reason. The modification of the F_1 function of Nakashima '220 when the Office Action combines this reference with Rodriguez still cannot achieve the present invention, because the present invention solves completely different problems and uses different methods from the cited primary reference. As mentioned as one example, Nakashima '220 measures the plasticity during continuous kneading and has the problem of pseudo-gelation.

(E) Impermissible Level of Hindsight Reconstruction

Thus, the only way to achieve the present invention is to read the present specification, review what is being claimed, and using substantial hindsight reconstruction by combining reference A with reference B.

However, this reconstruction is contrary to case law when the USPTO has simply chosen elements from the cited references after considering

the instant disclosure to order to come up with the components as presently claimed (*i.e.*, claim 10). The USPTO has, therefore, relied on an impermissible level of "hindsight reconstruction" as a basis of support of the instant rejection. As stated by the Federal Circuit in *Sensonics Inc. v. Aerosonic Corp.* 38 USPQ2d 1551 (Fed. Cir 1996):

> To draw on hindsight knowledge of the patented invention, when the prior art does not contain or suggest that knowledge, is to use the invention as a template for its own reconstruction -- an illogical and inappropriate process by which to determine patentability. *W.L. Gore & Assoc. v. Garlock, Inc.*, 721 F.2d 1540, 1553, 220 USPQ 303, 312-13 (Fed. Cir. 1983). The invention must be viewed not after the blueprint has been drawn by the inventor, but as it would have been perceived in the state of the art that existed at the time the invention was made. *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1138, 227 USPQ 543, 547 (Fed. Cir. 1985).

(F) Summary

Thus, Applicants respectfully submit that the present invention is patentably distinct from the cited combination of references, and that a *prima facie* case of obviousness has not been established. Also, impermissible hindsight reconstruction has been used. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

Conclusion

A full and complete response has been made to all issues as cited in the Office Action. Applicants have taken substantial steps in efforts to advance prosecution of the present application. Thus, Applicants respectfully request that a timely Notice of Allowance issue for the present case.

If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to contact Eugene T. Perez (Reg. No. 48,501) at the offices of Birch, Stewart, Kolasch & Birch, LLP at the number given below.

Pursuant to 37 C.F.R. § 1.17 and 1.136(a), Applicants respectfully petition for a one (1) month extension of time for filing a response in connection with the present application. The required fee of $110.00 is attached hereto.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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Attachments